

Contents

Foreword	iv
The NIST Center for Neutron Research	1
NIST Center for Neutron Research Layout	2
Cold Source Replacement	4
Research Highlights	
Instrumentation Development and Applications	
The Advanced Liquid Hydrogen Cold Neutron Source	6
Neutron Spin Filters Based on Polarized ^3He	8
Development of an Ion-Implanted Phosphorus in Silicon SRM for the Semiconductor Industry	10
New Thermal Neutron Prompt Gamma-Ray Activation Analysis Facility	12
Performance Enhancements of the CHRNS 30-m SANS Instrument	14
Chemical Physics and Biology	
Probing Nanoscale Disorder with Neutron Tunneling Spectroscopy	16
The “Bucket Brigade” Mechanism of Proton Diffusion in Superprotic Conductors	18
Motion in Intermediates Along the Protein-Folding Pathway: <i>cytochrome c</i>	20
Neutron Reflectivity from Biomimetic Membranes: Improving Reliability Through Wavelet Analysis	22
Protein Adsorption to Metal-Chelating Lipid Monolayers	24
Hydration State of Single <i>cytochrome c</i> Monolayers on Soft Interfaces via Neutron Reflectivity	26
Soft Condensed Matter	
Direct Measurement of the Reaction Front in Chemically Amplified Photoresists	28
Scaling of Membrane Phase Dynamics	30
Observation of Liquid-Glass-Liquid and Glass-Glass Transitions in the L64/D ₂ O Copolymer Micellar System	32
Early-Stage Compositional Segregation in Polymer Blend Films	34
Condensed Matter and Applied Physics	
Magnetic Cluster Sizes in Magnetic Recording Disks	36
Dynamical Effects of Polar Nanoregions in Relaxor Ferroelectrics	38
Emergent Excitations in a Geometrically Frustrated Magnet	40
Polaron Dynamics and the Glass Transition in Colossal Magnetoresistance Materials	42
Quantum Impurities in the Two-Dimensional Spin One-Half Heisenberg Antiferromagnet	44
Automobile Sheet-Metal “Springback”: Residual Stress Measurements and Modeling	46
Serving the Science and Technology Community	
NCNR Partnership Celebration	48
The NCNR User Program	48
The Center for High Resolution Neutron Scattering	49
Collaborations	49
Cold Neutrons for Biology and Technology	49
Independent Programs	49
Eighth Annual Summer School	52
Operations	53
Facility Developments	54
DAVE and Other Software Developments	54
New Monochromator Drum Shields	54
Sample Environment Equipment	55
Facility Improvements	55
Publications	56
Instruments and Contacts	68
Contacts	Inside Back Cover